

# Long-Term Pavement Performance Data Analysis Program

Strategic Plan Objectives, Analysis Outcomes, and Supporting Projects



<div>Strategic Objective 1:</div> <div>Traffic characterization and prediction</div>	<div>Strategic Objective 2:</div> <div>Materials characterization</div>	<div>Strategic Objective 3:</div> <div>Determination of environmental effects in pavement design and performance prediction.</div>	<div>Strategic Objective 4:</div> <div>Evaluation and use of pavement condition data in pavement management.</div>	<div>Strategic Objective 5:</div> <div>Development of pavement response and performance models applicable to pavement design and performance prediction.</div>	<div>Strategic Objective 6:</div> <div>Maintenance and rehabilitation strategy selection and performance prediction.</div>	<div>Strategic Objective 7:</div> <div>Quantification of the performance impact of specific design features (e.g., deflections, load-transfer, strains, etc.)</div>
<div><div>A. Guidelines for data collection (hardware, software, placement, calibration, data collection frequency, etc.)</div><div>Some elements require work beyond LTPP data analysis, but analysis is needed to provide some components.</div><div><div>NCHRP 1-39</div><div>\$500,000</div><div>Traffic Data Collection, Analysis, and Forecasting for Mechanistic Pavement Design.</div><div>Aug. 30, 2000</div><div>Product: Report 509</div><div>July 30, 2004</div><div>Cambridge Systematics</div><div>Wentworth/Hanna</div></div><div><div>FWHA</div><div>\$450,000</div><div>Confidence of WIM Axiel Load Data, formerly NCHRP 20-50(19)</div><div>Planned 2003</div><div>TBD</div></div><div><div>B. Guidelines for applying traffic loading and classification data in pavement design.</div><div><div>FWHA</div><div>\$267,810</div><div>Optimization of Traffic Data Collection for Specific Pavement Applications.</div><div>Jan. 23, 2003</div><div>Nichols</div><div>Papadimitrakou/Wisner</div><div>To Be Coordinated with NCHRP 1-39</div></div><div><div>C. Procedures for forecasting and back-casting traffic loading data.</div><div><div>FWHA</div><div>\$250,000</div><div>Estimating Cumulative Traffic Loads, Phase 1.</div><div>Project completed.</div><div>Oct. 15, 1998</div><div>Sept. 30, 2001</div><div>Haghighi/Wisner</div></div><div><div>FWHA</div><div>\$293,000</div><div>Estimating Cumulative Traffic Loads, Phase 2.</div><div>Project completed.</div><div>Oct. 31, 1998</div><div>Dec. 30, 2002</div><div>Haghighi/Wisner</div></div><div><div>Problem Statement Number</div><div>41C</div><div>Procedures for forecasting and back-casting traffic loading data. (Traffic ETG)</div><div>12 months</div><div>\$250,000</div></div><div><div>D. Impact of pavement roughness on the dynamic loads applied to pavements.</div><div><div>Problem Statement Number</div><div>41D</div><div>Tools for analyzing errors and improving accuracy of existing WIM systems.</div><div>24 months</div><div>\$450,000</div></div></div></div></div></div>	<div><div>A. Relative importance of different material characteristics in predicting pavement performance.</div><div><div>NCHRP 20-50(14)</div><div>\$100,000</div><div>Significance of "As-Constructed" AC Air Voids to Pavement Performance.</div><div>Project completed.</div><div>June 5, 2000</div><div>Research digest 269</div><div>June 28, 2002</div><div>Applied Pav. Tech.</div><div>Simpson/Hanna</div></div><div><div>FWHA</div><div>\$243,000</div><div>Assessment of Selected LTPP Material Data Tables and Development of Representative Test Tables - Volume I.</div><div>Project completed.</div><div>Sept. 1, 1999</div><div>Report: FHWA-RD-02-001</div><div>Mar. 1, 2001</div><div>ERES</div></div><div><div>FWHA</div><div>\$27,000</div><div>Study of LTPP Laboratory Resilient Modulus Test Data and Response Characteristics.</div><div>Project completed.</div><div>June 1, 2000</div><div>Report: FHWA-RD-02-051</div><div>Apr. 30, 2001</div><div>ERES/Fugro-BRE</div><div>Von Quarin/Richter</div></div><div><div>B. Relationships to enable interchangeable use of laboratory and field-derived material parameters.</div><div><div>FWHA</div><div>\$100,000</div><div>Review of the SPSS (SUPERVISOR) Validation Experiment.</div><div>Planned 2003</div><div>TBD</div></div><div><div>FWHA</div><div>\$50,000</div><div>Review of Laboratory Resilient Modulus Test Data and Response Characteristics.</div><div>Planned 2003</div><div>TBD</div></div><div><div>FWHA</div><div>\$231,930</div><div>Temperature Predictions and Adjustment Factors for Asphalt Pavements.</div><div>Project completed.</div><div>Oct. 1, 1999</div><div>Report: FHWA-RD-98-085</div><div>June 1, 1999</div><div>Brown</div><div>Lukonen/Richter</div></div><div><div>FWHA</div><div>\$270,000</div><div>Analyses Relating to Pavement Material Characterization and Their Effects on Pavement Performance.</div><div>Project completed.</div><div>Apr. 1, 1995</div><div>Report: FHWA-RD-97-076</div><div>Sept. 1, 1997</div><div>Fugro-BRE</div><div>Von Quarin/Richter</div></div><div><div>FWHA</div><div>\$125,000</div><div>Backcalculation of Layer Parameters for LTPP Test Sections, Volume I.</div><div>Project completed.</div><div>July 1, 1997</div><div>Report: FHWA-RD-00-086</div><div>July 31, 1998</div><div>ERES</div><div>Khazanchikov/Richter</div></div><div><div>FWHA</div><div>\$171,000</div><div>Backcalculation of Layer Parameters for LTPP Test Sections, Volume II.</div><div>Project completed.</div><div>May 1, 1997</div><div>Report: FHWA-RD-01-113</div><div>Aug. 31, 2001</div><div>Fugro-BRE</div><div>Von Quarin/Richter</div></div><div><div>FWHA</div><div>\$228,875</div><div>Review of LTPP Backcalculation Results.</div><div>Planned 2003</div><div>TBD</div></div><div><div>FWHA</div><div>\$200,000</div><div>Relationship between Laboratory and Field-Derived Properties of Pavement Layers.</div><div>Planned 2003</div><div>TBD</div></div><div><div>C. Relationship between as-designed and as-built material characteristics.</div><div><div>Problem Statement Number</div><div>281</div><div>Estimation of key PCC, base, subbase, and component engineering properties from index properties, routine tests, and physical characteristics. (Materials ETG)</div><div>24 months</div><div>\$200,000</div></div><div><div>Problem Statement Number</div><div>282</div><div>Estimation of key hot mix asphalt, base, subgrade, and component engineering properties from routine tests, and physical characteristics. (Materials ETG)</div><div>24 months</div><div>\$200,000</div></div><div><div>D. Performance impact of different levels of material variability and quality.</div><div><div>Problem Statement Number</div><div>2F1</div><div>Improved deflection-based analysis methods for materials characterization.</div><div>24 months</div><div>\$200,000</div></div></div></div></div></div>	<div><div>A. Impact of temperature and moisture variations (independent of frost penetration) on pavement performance.</div><div><div>NCHRP 9-23</div><div>\$487,234</div><div>Environmental Effects in Pavement Mix and Structural Design Systems.</div><div>Feb. 27, 2001</div><div>Aug. 31, 2004</div><div>Arizona State Univ.</div><div>Moulton/Hanna</div></div><div><div>NCHRP 20-50(12)</div><div>\$349,689</div><div>Daily and Seasonal Variations in In-Situ Material Properties.</div><div>Project completed.</div><div>Feb. 7, 2000</div><div>Web document 60</div><div>Aug. 31, 2003</div><div>U. of Tennessee</div><div>Drumm/Hanna</div></div><div><div>FWHA</div><div>\$94,000</div><div>Study of LTPP Pavement Temperatures.</div><div>Project completed.</div><div>Oct. 1998</div><div>Project pending.</div><div>Nov. 1999</div><div>Brown/Conspav</div><div>Lukonen/Symons</div></div><div><div>FWHA</div><div>\$103,056</div><div>Analysis of Time Domain Reflectometry Data.</div><div>Project completed.</div><div>Aug. 1997</div><div>Report: FHWA-RD-99-115</div><div>July 1998</div><div>ERES</div><div>Jiang/Richter</div></div><div><div>B. Impact of freeze-thaw cycles on pavement performance.</div><div><div>FWHA</div><div>\$0</div><div>Seasonal Variations in Unbound Pavement Materials.</div><div>Project completed.</div><div>Mar. 2001</div><div>Report pending.</div><div>Richter</div></div><div><div>FWHA</div><div>\$100,840</div><div>Evaluation of LTPP Site-Specific Climatic Data.</div><div>Planned 2003</div><div>TBD</div></div><div><div>Problem Statement Number</div><div>3A1</div><div>Assessment of the effects of loading and environment on pavement life using SPSS data.</div><div>24 months</div><div>\$300,000</div></div><div><div>C. Long-term changes in pavement characteristics due to environmental effects and aging.</div><div><div>FWHA</div><div>\$88,822</div><div>Determination of Frost Penetration in LTPP Sections.</div><div>Project completed.</div><div>Aug. 1997</div><div>Report: FHWA-RD-98-088</div><div>July 1998</div><div>ERES</div><div>Jiang/Richter</div></div><div><div>FWHA</div><div>\$375,000</div><div>Effect on Performance of Multiple Freeze Cycles vs. Deep Frost Penetration.</div><div>Mar. 4, 2003</div><div>Sept. 4, 2005</div><div>Nichols</div><div>Jackowski/Wisner</div></div><div><div>Problem Statement Number</div><div>3B2</div><div>Pavement damage caused by swelling and frost susceptible soils.</div><div>24 months</div><div>\$300,000</div></div><div><div>D. Recommendations for climate data collection to adequately predict pavement performance.</div><div><div>FWHA</div><div>\$135,000</div><div>Verification of LTPP Virtual Weather Stations.</div><div>Project completed.</div><div>Jan. 2000</div><div>Project pending.</div><div>Oct. 2000</div><div>Mohseni</div><div>Mohseni/Symons</div></div><div><div>E. Region specific guidelines for considering environmental and load effects.</div><div><div>FWHA</div><div>\$N/A</div><div>LTPP Seasonal Asphalt Concrete Pavement Temperature Models.</div><div>Project completed.</div><div>Mar. 1, 1995</div><div>Report: FHWA-RD-97-103</div><div>June 1, 1996</div><div>Ba/Sy</div></div><div><div>Problem Statement Number</div><div>3E1</div><div>Region specific guidelines for pavement modeling and design considering environmental effects.</div><div>24 months</div><div>\$300,000</div></div></div></div></div></div></div>	<div><div>A. Comprehensive guidelines for assessing the relative performance of different pavements.</div><div><div>NCHRP 1-35A</div><div>\$200,000</div><div>Guide for Pavement Management.</div><div>Project completed.</div><div>Dec. 1, 1997</div><div>ASHTO Pavement Management Guide</div><div>Texas A&amp;M Univ.</div><div>Smith/Hanna</div></div><div><div>FWHA</div><div>\$55,838</div><div>Analysis of LTPP Friction Data.</div><div>Project completed.</div><div>Aug. 1, 1997</div><div>Report: FHWA-RD-99-037</div><div>July 1, 1998</div><div>ERES</div></div><div><div>FWHA</div><div>\$100,000</div><div>Study of LTPP Distress Data Variability.</div><div>Project completed.</div><div>Jan. 1, 1997</div><div>Report: FHWA-RD-99-074</div><div>Aug. 1, 1998</div><div>ERES</div></div><div><div>FWHA</div><div>\$141,000</div><div>Distress Data Consolidation.</div><div>Project completed.</div><div>Aug. 15, 1998</div><div>Project pending.</div><div>Dec. 2000</div><div>Fugro-BRE</div><div>Staff/Wisner</div></div><div><div>B. Improve measures of pavement structural condition for use in network-level pavement management.</div><div><div>FWHA</div><div>\$397,000</div><div>LTPP Pore Variability.</div><div>Project completed.</div><div>July 28, 1997</div><div>Report: FHWA-RD-00-113</div><div>Mar. 1, 2000</div><div>ERES</div><div>Evans/Richter</div></div><div><div>FWHA</div><div>\$58,000</div><div>Preliminary Evaluation and Analysis of LTPP Faulting Data.</div><div>Project completed.</div><div>May 1, 1998</div><div>Report: FHWA-RD-00-076</div><div>Sept. 1, 1998</div><div>ERES</div><div>Toviss/Richter</div></div><div><div>FWHA</div><div>\$196,000</div><div>Characterization of Transverse Profiles.</div><div>Project completed.</div><div>Sept. 1, 2000</div><div>Report: FHWA-RD-01-024</div><div>Sept. 1, 2000</div><div>Fugro-BRE</div><div>Simpson/Richter</div></div><div><div>FWHA</div><div>\$60,000</div><div>Pavement Smoothness Index Relationships.</div><div>Project completed.</div><div>Feb. 1, 2001</div><div>Report: FHWA-RD-02-057</div><div>Nov. 1, 2001</div><div>ERES</div><div>Smith/Wisner</div></div><div><div>FWHA</div><div>\$74,997</div><div>Smoothness Index Differences Related to LTPP Equipment Type.</div><div>Jan. 6, 2004</div><div>Oct. 6, 2004</div><div>Peera/Wisner</div></div><div><div>Problem Statement Number</div><div>4A1</div><div>Develop improved pavement performance assessment model for life-cycle cost determination.</div><div>24 months</div><div>\$400,000</div></div><div><div>Problem Statement Number</div><div>4A2</div><div>Develop hierarchical data collection for network- and project-level pavement management systems.</div><div>24 months</div><div>\$400,000</div></div><div><div>Problem Statement Number</div><div>4A3</div><div>Types and frequencies of measurements for accurate description of pavement condition.</div><div>24 months</div><div>\$400,000</div></div><div><div>Problem Statement Number</div><div>4A4</div><div>Numerical pavement evaluation indices for pavement condition.</div><div>24 months</div><div>\$400,000</div></div><div><div>C. Models relating functional and structural performance.</div><div><div>FWHA</div><div>\$100,000</div><div>Study of LTPP Pavement Deflections.</div><div>Project completed.</div><div>Sept. 2001</div><div>Project pending.</div><div>Sept. 2001</div><div>Conspav</div><div>Substans/Hanna</div></div><div><div>FWHA</div><div>\$100,000</div><div>Characterization of PCC Pavement Condition.</div><div>Planned 2003</div><div>TBD</div></div><div><div>FWHA</div><div>\$200,000</div><div>Development of Techniques for Estimation and Interpretation of Pavement Deflections for Network-Level Analysis.</div><div>Planned 2003</div><div>TBD</div></div><div><div>Problem Statement Number</div><div>4C1</div><div>Relating ride quality and structural adequacy for pavement rehabilitation design decisions.</div><div>12 months</div><div>\$200,000</div></div><div><div>D. Criteria for applying performance measures (including variability) to construction quality evaluation.</div><div><div>NCHRP 20-50(9)</div><div>\$174,998</div><div>Feasibility of Using FWD Deflection Data to Characterize Pavement Construction Quality.</div><div>Project completed.</div><div>May 2, 2000</div><div>Web document 52</div><div>June 3, 2002</div><div>Conspav</div><div>Substans/Hanna</div></div><div><div>Problem Statement Number</div><div>4D1</div><div>Criteria for applying performance measures to construction quality evaluation.</div><div>24 months</div><div>\$200,000</div></div><div><div>E. Relationship between variation in pavement performance measures and environmental factors.</div><div><div>Problem Statement Number</div><div>4E1</div><div>Quantitative information of environmental variables on pavement performance measures.</div><div>24 months</div><div>\$200,000</div></div><div><div>Problem Statement Number</div><div>4E2</div><div>PCC temperature correction factors for interpretation of FWD test results.</div><div>24 months</div><div>\$200,000</div></div></div></div></div></div></div>	<div><div>A. Guidelines for selection of appropriate load-response models for use in pavement design as a function of the acceptable level of risk and model complexity.</div><div><div>NCHRP 1-37A</div><div>\$6,670,000</div><div>Development of the 2002 Guide for the Design of New and Rehabilitated Pavement Structures (Phase II).</div><div>Project completed.</div><div>Feb. 1, 1998</div><div>Web document 47</div><div>Feb. 28, 2004</div><div>ERES</div><div>Halli/Hanna</div></div><div><div>FWHA</div><div>\$60,000</div><div>Comparison and Quality Evaluation of LTPP Dynamic Load Response Data from Ohio and North Carolina.</div><div>Project completed.</div><div>Dec. 1999</div><div>Report pending.</div><div>Dec. 2000</div><div>FWHA Staff</div></div><div><div>B. Mechanistic-empirical procedures for using commonly collected pavement data to predict specific distresses.</div><div><div>NCHRP 20-50(5)</div><div>\$249,991</div><div>Variations in Pavement Design Inputs.</div><div>Project completed.</div><div>Oct. 13, 1999</div><div>Web document 48</div><div>Oct. 12, 2001</div><div>Conspav</div><div>Substans/Hanna</div></div><div><div>Problem Statement Number</div><div>5A1</div><div>Evaluation of the performance prediction models in the 2002 Pavement Design Guide.</div><div>24 months</div><div>\$400,000</div></div><div><div>C. Calibrated relationships (transfer functions) between pavement response and individual distress types.</div><div><div>FWHA</div><div>\$84,000</div><div>Validation of Guidelines for k-Value Selection and Concrete Pavement Performance Prediction.</div><div>Project completed.</div><div>Oct. 1, 1994</div><div>Report: FHWA-RD-96-198</div><div>July 1, 1996</div><div>ERES</div><div>Halli/Richter</div></div><div><div>FWHA</div><div>\$84,000</div><div>Design and Construction of PCC Pavements, Volume I.</div><div>Project completed.</div><div>Oct. 1, 1994</div><div>Report: FHWA-RD-98-052</div><div>Aug. 1, 1998</div><div>ERES</div><div>Ambr/Richter</div></div><div><div>FWHA</div><div>\$84,000</div><div>Design and Construction of PCC Pavements, Volume II.</div><div>Project completed.</div><div>Oct. 1, 1994</div><div>Report: FHWA-RD-98-127</div><div>Aug. 1, 1998</div><div>ERES</div><div>Glover/Richter</div></div><div><div>FWHA</div><div>\$84,000</div><div>Design and Construction of PCC Pavements, Volume III.</div><div>Project completed.</div><div>Oct. 1, 1994</div><div>Report: FHWA-RD-98-113</div><div>Aug. 1, 1998</div><div>ERES</div></div><div><div>Problem Statement Number</div><div>5C1</div><div>Evaluation of pavement performance models.</div><div>24 months</div><div>\$200,000</div></div><div><div>Problem Statement Number</div><div>5C2</div><div>Development of longitudinal cracking models for PCC pavements.</div><div>24 months</div><div>\$200,000</div></div></div></div></div>	<div><div>A. Performance and efficacy of maintenance and rehabilitation treatments as a function of pre-treatment condition.</div><div><div>NCHRP 20-50(34)</div><div>\$250,000</div><div>Effectiveness of Maintenance and Rehabilitation Options.</div><div>Project completed.</div><div>Oct. 14, 1999</div><div>Web document 47</div><div>Mar. 31, 2001</div><div>Kathleen Hill</div></div><div><div>FWHA</div><div>\$54,000</div><div>Performance of Rehabilitated AC Pavements in the LTPP Experiments.</div><div>Project completed.</div><div>Oct. 1, 1997</div><div>Report pending.</div><div>Aug. 1, 1999</div><div>Fugro-BRE</div></div><div><div>FWHA</div><div>\$25,433</div><div>Assessment of the SPB-7 Bonded Concrete Overlay Experiment.</div><div>Project completed.</div><div>July 1, 1998</div><div>Report: FHWA-RD-98-130</div><div>Dec. 1, 2000</div><div>ERES</div><div>Smith/Richter</div></div><div><div>B. Guidelines for timing and selection of pavement maintenance and rehabilitation options, and expected performance impacts of each.</div><div><div>NCHRP 1-38</div><div>\$100,000</div><div>Guide on Pavement Rehabilitation Strategies.</div><div>Project completed.</div><div>Mar. 1, 1998</div><div>Web document 35</div><div>Mar. 31, 2001</div><div>Kathleen Hill</div></div><div><div>NCHRP 14-14</div><div>\$312,397</div><div>Guide for Optimal Timing of Pavement Preventive Maintenance Treatment Applications.</div><div>Project completed.</div><div>Apr. 10, 2000</div><div>Sept. 30, 2003</div><div>Applied Pav. Tech.</div><div>Peshkian/Hanna</div></div><div><div>Problem Statement Number</div><div>6B1</div><div>Guidelines for selecting pavement rehabilitation strategies that consider impact on pavement life and/or performance. (after 20-50(34) (6A))</div><div>18 months</div><div>\$300,000</div></div><div><div>C. Guidelines for the selection of pavement design features.</div><div><div>NCHRP 1-34A</div><div>\$149,923</div><div>Contributions of Pavement Structural Layers to Rating of Flexible Pavements.</div><div>Project completed.</div><div>June 18, 1999</div><div>Report 488</div><div>July 31, 1999</div><div>Barber</div><div>Purvis RT</div><div>White-Haddock/Hanna</div></div><div><div>NCHRP 1-34B</div><div>\$50,000</div><div>Effectiveness of Subsurface Drainage for HMA and PCC Pavements.</div><div>Project completed.</div><div>Apr. 1, 1999</div><div>Research digest 268</div><div>Nov. 30, 1999</div><div>Kathleen Hill</div></div><div><div>NCHRP 1-34C</div><div>\$116,024</div><div>Effects of Subsurface Drainage on Performance of Asphalt and Concrete Pavements.</div><div>Project completed.</div><div>Apr. 6, 2000</div><div>Report 495</div><div>Mar. 31, 2003</div><div>Kathleen Hill</div></div><div><div>NCHRP 1-34D</div><div>\$220,000</div><div>Effects of Subsurface Drainage on Performance of Asphalt and Concrete Pavements. Evaluation and Analysis of LTPP SPSS-1 and SPSS-2 Field Sections.</div><div>Project completed.</div><div>Nov. 18, 2002</div><div>Nov. 30, 2004</div><div>Kathleen Hill</div><div>Halli/Hanna</div></div><div><div>NCHRP 20-50(13)</div><div>\$199,998</div><div>Factors Affecting Pavement Smoothness.</div><div>Project completed.</div><div>Oct. 25, 1999</div><div>Web document 40</div><div>Dec. 30, 2001</div><div>Sall &amp; Marti Engrs.</div><div>Kohn/Hanna</div></div><div><div>FWHA</div><div>\$194,534</div><div>Investigation of Development of Pavement Roughness.</div><div>Project completed.</div><div>June 1, 1995</div><div>Report: FHWA-RD-97-147</div><div>Aug. 1, 1997</div><div>Sall &amp; Marti Engrs.</div><div>Peera/Richter</div></div><div><div>FWHA</div><div>\$240,003</div><div>Characteristics of Good and Poorly Performing PCC Pavements.</div><div>Project completed.</div><div>Oct. 1, 1996</div><div>Report: FHWA-RD-97-131</div><div>Nov. 1, 1997</div><div>ERES</div><div>Khazanchikov/Richter</div></div><div><div>FWHA</div><div>\$240,003</div><div>Common Characteristics of Good and Poorly Performing AC Pavements.</div><div>Project completed.</div><div>Oct. 1, 1996</div><div>Report: FHWA-RD-98-193</div><div>Nov. 1, 1997</div><div>Fugro-BRE</div><div>Rauscher/Richter</div></div><div><div>FWHA</div><div>\$100,000</div><div>Evaluation and Characterization of Pavement Drainage.</div><div>after NCHRP 1-34D</div><div>Planned 2003</div><div>TBD</div></div><div><div>Problem Statement Number</div><div>7B1a</div><div>Determine the impact of design features on pavement distresses for new flexible pavements.</div><div>24 months</div><div>\$200,000</div></div><div><div>Problem Statement Number</div><div>7B1b</div><div>Determine the impact of design features on pavement distresses for new rigid pavements.</div><div>24 months</div><div>\$300,000</div></div><div><div>D. Guidelines for the selection of pavement design features.</div><div><div>Problem Statement Number</div><div>7C1</div><div>Guidelines for the selection of pavement design features.</div><div>24 months</div><div>\$300,000</div></div></div></div></div></div>	

**Priorities**

Critical

Very High

High

Sequence

1 2 3

**NCHRP project number**

NCHRP project title

Effective Date

Completion Date

Responsible Agency

Principal Inv./NCHRP Staff

**FWHA Technical Support Contract**

Project title

Planned Start Date

Completion Date

Responsible Agency

Principal Inv./FWHA Staff

**Problem Statement Number**

Proposed problem title

Project duration

Anticipated project start

Project end

Dashed light blue boxes are on-going NCHRP projects that were initiated by LTPP ETG. Solid Light Blue boxes are completed projects.

Dashed pink boxes are on-going NCHRP projects that were initiated by other agencies or work groups, but are directly associated with LTPP Data Analysis Plus Strategic Objectives and Analysis Outcomes. Solid Pink boxes are completed projects.

Dashed white boxes are proposed Research Problem Statements that were developed at LTPP Workshops. (See Note 1) for an explanation of the Problem Statement Numbering scheme.

Dashed orange boxes are planned FWHA projects that will be funded using LTPP budgeted funds.

Dashed orange boxes are planned FWHA projects that will be funded using LTPP budgeted funds.

Dashed orange boxes are planned FWHA projects that will be funded using LTPP budgeted funds.

Thin solid boxes are completed projects with reports pending.

Thick solid boxes are completed projects with reports published.

**Note**

1) Problem Statements are assigned a 3 character number using the convention "O.A.N." 'O' is the associated Strategic Objective number (1 through 7); 'A' is the associated Analysis Outcome letter (A, B, C, etc.) and 'N' is an arbitrarily assigned number used for identification purposes. The number 'N' does not imply a sequence in which Problem Statements should be addressed.